

What is claimed is:

1. A dewatering system in a paper machine, the dewatering system comprising:
a dewatering fabric, including:
a woven permeable fabric; and
a polymeric layer having openings therethrough, said polymeric layer connected
5 to said permeable fabric; and
a press apparatus applying pressure to a portion of said dewatering fabric.
2. The system of claim 1, wherein said dewatering fabric further includes at least one batt layer needled to said permeable fabric and said polymeric layer, thereby connecting said permeable fabric and said polymeric layer.
3. The system of claim 2, wherein said at least one batt layer includes a first batt layer and a second batt layer, said first batt layer adjacent said permeable fabric, said second batt layer adjacent said polymeric layer, said first batt layer and said second batt layer needled to said permeable fabric and said polymeric layer.
- 5 4. The system of claim 1, wherein said polymeric layer is a flexible polyurethane.
5. The system of claim 1, wherein said polymeric layer is a grid of polymeric material, said grid having a plurality of machine direction runs and a plurality of cross direction runs.
6. The system of claim 5, wherein said dewatering fabric further includes a plurality of yarns combined with said grid of polymeric material, thereby forming a composite layer, at least

one of said yarns internal to each of a corresponding one of said plurality of machine direction runs.

7. The system of claim 6, wherein said dewatering fabric further includes at least one batt layer needled to said permeable fabric and said composite layer, thereby connecting said permeable fabric and said composite layer.

8. The system of claim 1, wherein said polymeric layer is connected to said permeable fabric by at least one of laminating, melting, re-melting and an adhesive.

9. The system of claim 1, wherein said polymeric layer includes a plurality of yarns within said polymeric layer.

10. The system of claim 1, further comprising:

an other fabric; and

a vacuum roll in at least partial contact with a side of said dewatering fabric.

11. The system of claim 10, wherein said dewatering fabric carries a web on one side thereof.

12. The system of claim 11, wherein a side of said other fabric contacts a side of the web.

13. The system of claim 12, wherein said press apparatus applies pressure to a portion of an other side of said other fabric.

14. The system of claim 13, wherein said press apparatus is a belt press;

15. The system of claim 13, wherein said press includes an extended nip press belt in contact with said portion of said other side of said other fabric.

16. The system of claim 15, wherein said extended nip press belt includes a plurality of grooves.

17. The system of claim 16, wherein said extended nip belt additionally includes a plurality of holes drilled therethrough, said plurality of holes in fluid communication with at least one corresponding groove.

18. The system of claim 10, wherein said vacuum roll has a vacuum zone by which air is drawn through said other fabric, said web and said dewatering fabric.

19. A paper machine moisture removal system, comprising:
a vacuum roll; and
a permeable membrane in at least partial surface contact with said vacuum roll, said permeable membrane including:

5 at least one batt fiber layer; and

a permeable fabric, said at least one batt fiber layer and said permeable fabric being needle punched with straight through drainage channels; and
a permeable extended nip press belt applying pressure to a portion of said permeable membrane.

20. The system of claim 19, wherein said permeable membrane further comprises at least one anti-rewet layer attached to at least one of said permeable fabric and said at least one batt fiber.

21. The system of claim 20, wherein said anti-rewet layer is an elastomeric membrane.

22. The system of claim 21, wherein said elastomeric membrane is less than approximately 1.05 mm thick.

23. The system of claim 20, further comprising an anti-rewet layer having a first side and a second side, said first side attached to said permeable fabric, said at least one batt fiber layer includes an other batt fiber layer connected to said second side.

24. The system of claim 23, wherein said anti-rewet layer includes pores therethrough.

25. The system of claim 19, wherein said permeable belt has a tension of at least 30 KN/m applied thereto, said permeable belt having a side with an open area of at least approximately 25%, said side having a contact area of at least approximately 25%.

26. The system of claim 19, wherein said permeable belt is a spiral link fabric belt.

27. The system of claim 19, further comprising an other fabric in at least partial contact with said permeable belt, said other fabric.

28. A method of manufacturing a fibrous web in a paper machine, comprising the steps of:

forming the fibrous web on a dewatering fabric;

5 applying pressure against a contact area of the fibrous web with a portion of a permeable belt, said contact area being at least approximately 25% of said portion; and

moving air through said permeable belt adjacent said contact area in open areas, said open areas being at least approximately 25% of said portion, said permeable belt having a tension of at least 30 KN/m applied thereto.

29. The method of claim 28, wherein said moving air step additionally includes moving air with moisture from the fibrous web through said dewatering fabric.

30. A method of manufacturing a fibrous web in a papermaking machine, comprising the steps of:

forming the fibrous web in a forming device;

5 carrying the fibrous web from said forming device through an extended nip press apparatus;

carrying the fibrous web from said extended nip press apparatus to a transfer point; and transferring the fibrous web at said transfer point to a drying cylinder.

31. The method of claim 30, further comprises carrying the web on a fabric in said carrying the web through an extended nip press apparatus step.

32. The method of claim 31, wherein said fabric is a dewatering fabric.

33. The method of claim 32, wherein said dewatering fabric has a thickness of less than approximately 2.0 mm.

34. The method of claim 33, wherein said dewatering fabric has a thickness of less than approximately 1.5 mm.

35. The method of claim 34, wherein said dewatering fabric has a thickness of less than approximately 1.00 mm.

36. The method of claim 32 wherein said dewatering fabric has an air permeability of less than 130 cfm.

37. The fabric of claim 36, wherein said air permeability is less than 100 cfm.

38. The method of claim 31, further comprising the step of passing air through a permeable belt that is part of said extended nip press apparatus, said air traveling further through the fibrous web and through said fabric.

39. The method of claim 38, wherein said permeable belt is under a tension of at least 30 KN/m.

40. The method of claim 31, wherein said fabric includes:

a woven permeable fabric; and

a polymeric layer having openings therethrough, said polymeric layer connected to said permeable fabric.

41. A dewatering fabric for use in a paper machine, the dewatering fabric comprising:

a woven permeable fabric; and

a polymeric layer having openings therethrough, said polymeric layer connected to said permeable fabric.

42. The dewatering fabric of claim 41, wherein said dewatering fabric further includes at least one batt layer needled to said permeable fabric and said polymeric layer, thereby connecting said permeable fabric and said polymeric layer.

43. The dewatering fabric of claim 42, wherein said at least one batt layer includes a first batt layer and a second batt layer, said first batt layer adjacent said permeable fabric, said second batt layer adjacent said polymeric layer, said first batt layer and said second batt layer needled to said permeable fabric and said polymeric layer.

44. The dewatering fabric of claim 43, wherein said polymeric layer is a flexible polyurethane.

45. The dewatering fabric of claim 43, wherein said polymeric layer is a grid of polymeric material, said grid having a plurality of machine direction runs and a plurality of cross direction runs.

46. The dewatering fabric of claim 45, wherein said dewatering fabric further includes a plurality of yarns combined with said grid of polymeric material, thereby forming a composite layer, at least one of said yarns internal to each of a corresponding one of said plurality of machine direction runs.

47. The dewatering fabric of claim 46, wherein said dewatering fabric further includes at least one batt layer needled to said permeable fabric and said composite layer, thereby connecting said permeable fabric and said composite layer.

48. The dewatering fabric of claim 41, wherein said polymeric layer is connected to said permeable fabric by at least one of laminating, melting, re-melting and an adhesive.

49. The dewatering fabric of claim 41, wherein said polymeric layer includes a plurality of yarns within said polymeric layer.